REMARKS/ARGUMENTS

Claims 1-19 remain in the application for further prosecution. No claims are amended, added, or canceled.

Claim Rejections – 35 USC § 103

Claims 1-4 and 6-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Publication No. 2003/0235315 ("Reesor"), filed on March 6, 2003, in view of U.S. Patent No. 6,326,912 ("Fujimori"), published December 25, 2003. Applicant respectfully traverses these rejections and requests reconsideration thereof.

Independent claim 1 recites, *inter alia*, "an analog-to-digital converter comprising a multi-level quantizer operatively coupled to the transducer element to convert the transducer signal into multi-bit samples representative of the transducer signal" and "a digital signal converter adapted to convert the multi-bit samples into an ***unformatted*** single-bit output signal." The Office Action concedes that Ressor does not expressly disclose these claimed features. Office Action, Pages 3-4. Rather, the Office Action asserts that Fujimori discloses an analog to digital converter comprising a multi-level quantizer and a digital signal converter adapted to convert the multi-bit sample into an unformatted single-bit output signal. Office Action, Page 4. The Office Action attempts to combine Ressor with Fujimori to argue that it would have been obvious to modify Ressor in view of Fujimori to arrive at the claimed invention; however, the combination fails for at least the following reasons.

Significantly, Ressor expressly <u>teaches away</u> from the claimed invention in that Ressor teaches that a multi-bit to single bit A/D converter is <u>undesirable</u>. Specifically, in the Background section, Ressor teaches that the prior-art "*multi-bit* output type MASH" (which converts an analog input into a multi-bit digital output) and a "parallel-to-serial conver[ter]" (which converts a multi-bit input into a single-bit output) included within the microphone housing "<u>do not lend themselves to cost-effective integration</u> with the analog components." Ressor, Page 1, ¶¶ 5-6. Ressor goes on to teach a <u>single-bit</u> sigma-delta modulator. Faced with these teachings, the person of ordinary skill in the art would be discouraged from using multi-bit to single-bit A/D converters in a digital microphone. Thus, Ressor teaches away from the claimed invention. As such, Applicant submits that Ressor cannot be combined with any reference, let alone Fujimori, to overcome Ressor's deficiencies. For at least these reasons,

claim 1 and claims 2-14, which depend therefrom, are believed to be allowable over Ressor in view of Fujimori.

Notwithstanding the impropriety of combining Ressor with Fujimori, Fujimori cannot overcome Ressor's failure to disclose "a digital converter adapted to convert a multi-bit sample into an *unformatted single-bit* output signal." Rather, Fujimori teaches that "the intent . . . is to provide a *conditioned* multi-bit data stream conducive for modulator 18 and *for whatever digital system is coupled to the output of modulator* 18," such as a super audio CD unit. Fujimori, Col. 6, ll. 55-61. Additionally, the output of the A/D converter disclosed by Fujimori is either a serial bit stream in a delta-sigma format "recognizable to, for example, super audio CDs" or a multi-bit PCM or delta-sigma format. Fujimori, Col. 3, ll. 56-60; Col. 4, ll. 7-9. Thus, Fujimori is directed to an A/D converter for the purpose of outputting a *formatted* signal in one of several different digital audio formats. Fujimori, Col. 3, ll. 30-50. This expressed intent in Fujimori to provide a *formatted* digital audio signal is directly contrary to one of the technical problems addressed in the present application, namely to improve the quality of a microphone digital audio signal while maintaining backwards compatibility with prior-art single-bit output digital microphones in that microprocessors or signal processors can be readily interfaced without any need to contain dedicated audio data interface circuitry compatible with several digital audio data protocols. <u>Both</u> Ressor and Fujimori explicitly teach away from these stated aspects. Ressor discourages multi-bit to single-bit conversion and Fujimori's intent is to provide a *formatted* audio signal that would lack compatibility with other digital audio systems that cannot handle the same audio format. The person of ordinary skill in the art would find no inspiration in either Ressor, Fujimori, or the combination thereof to provide, *inter alia*, a digital signal converter adapted to convert the multi-bit samples into an unformatted single-bit output signal as claimed, and would therefore find no motivation whatsoever in either reference to make the claimed combination.

Moreover, a person of ordinary skill in the art of digital microphones would not consult Fujimori for improvements relating to digital microphones. Fujimori relates to a multi-standard compatible A/D converter that can handle SACD and audio DVD audio formats in digital audio recording equipment for disc mastering purposes. The final signal recorded to an SACD or an audio DVD is normally processed from a large number of signal sources, such as microphones. In other words, Fujimori describes the format of the final audio signal that is recorded onto an

audio DVD. A digital microphone would provide an initial signal derived from a single source, which will be later processed (e.g., mixed with a number of other signals from other types of sources like keyboards, guitars, etc.) to provide the final signal. It would make no sense to format the output of a single digital microphone to that required for recording an SACD or audio DVD from plural signal sources, such as digital microphones themselves. A person of ordinary skill in the art looking to improve ways of providing and transporting the initial signal generated by digital microphones would not consult technology relating to disc mastering in recording studio equipment, which require further processing and formatting of the initial signal to produce the final signal in a required audio format. To reiterate, the pending claims require that the single-bit output signal be <u>unformatted</u>, so as to be, for example, readily interfaced with microprocessors or signal processors without any need to contain dedicated audio data interface circuitry compatible with several digital audio data protocols. For at least these additional reasons, claim 1 and claims 2-14, which depend therefrom, are believed to be allowable over Ressor in view of Fujimori.

Claim 3 recites, *inter alia*, "an *integral* clock generator." Ressor fails to disclose this feature. Rather, FIG. 2 of Ressor clearly illustrates that the clock generator (CLK) is *external* to the shield housing (3). Ressor, FIG. 2; p. 2, ¶¶ 21-22. Fujimori cannot overcome this deficiency of Ressor. For at least this additional reason, claim 3 is believed to be allowable over Ressor in view of Fujimori.

Claim 6 recites, *inter alia*, "the multi-level quantizer of the analog-to-digital converter comprises between 3 and 64 discrete quantization levels." Neither Ressor nor Fujimori disclose the claimed range of discrete quantization levels. Rather, Fujimori generally discloses that numerous orders and stages can be implemented. Applicant submits that the general statement of Fujimori does not teach the narrow range of specific discrete quantization levels claimed by the Applicant. Moreover, Fujimori does not expressly disclose any embodiment having a discrete quantization level within the claimed range. The range is not a matter of mere design choice. As disclosed in the present application, the multi-level quantizer provides several benefits including lower power consumption for a given S/N ratio, improved S/N ratio for a given sampling frequency, and improved suppression of annoying tonal noise components in the multi-bit samples or quantized signal. For at least these additional reasons, claim 6 is believed to be allowable over Ressor in view of Fujimori.

Claims 9 and 18 recite, *inter alia*, "the multilevel quantizer comprises 3 or 5 discrete quantization levels. Neither Ressor nor Fujimori disclose three or five discrete quantization levels. Rather Fujimori generally discloses that numerous orders and stages can be implemented. Applicant submits that the general statement of Fujimori does not teach the specific discrete quantization levels claimed by the Applicant. The quantization levels are not a matter of mere design choice. As disclosed in the present application, the multi-level quantizer provides several benefits including lower power consumption for a given S/N ratio, improved S/N ratio for a given sampling frequency, and improved suppression of annoying tonal noise components in the multi-bit samples or quantized signal. For at least these additional reasons claim 9 is believed to be allowable over Ressor in view of Fujimori.

Claim 10 recites, *inter alia*, "the multi-level quantizer comprises N discrete quantization levels and each corresponding symbol comprising N-1 bits; N being an integer between 3 and 17." Applicant notes that the Office Action does not cite any passage from either Ressor or Fujimori to support a rejection of this claim. In fact, neither Ressor nor Fujimori disclose the claimed range of discrete quantization levels and/or corresponding symbol bits. Furthermore, a generic statement in Fujimori that numerous orders and stages may be implemented is insufficient to teach the specific range claimed. As disclosed in the present application, the multi-level quantizer provides several benefits including lower power consumption for a given S/N ratio, improved S/N ratio for a given sampling frequency, and improved suppression of annoying tonal noise components in the multi-bit samples or quantized signal. For at least this reason, claim 10 is believed to be allowable over Ressor in view of Fujimori.
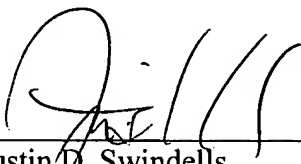
Claim 15 recites, *inter alia*, "an analog-to-digital converter comprising a multilevel-quantizer operatively coupled to the amplified transducer signal and adapted to convert the amplified transducer signal into multi-bit samples representative of the amplified transducer signal" and "a digital signal converter adapted to convert the multi-bit samples into an unformatted single-bit output signal." For at least the reasons articulated with respect to claim 1, claim 15 and claims 16-19, which depend therefrom, are believed to be allowable over Ressor in view of Fujimori.

Conclusion

It is the Applicant's belief that all of the pending claims are in condition for allowance and action towards that end is respectfully requested.

If any matters may be resolved or clarified through a telephone interview, the Examiner is respectfully requested to contact the Applicant's undersigned attorney at the number shown.

Respectfully submitted,

Date: July 22, 2008

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